Impervious Cover and its Effects on Water Quality

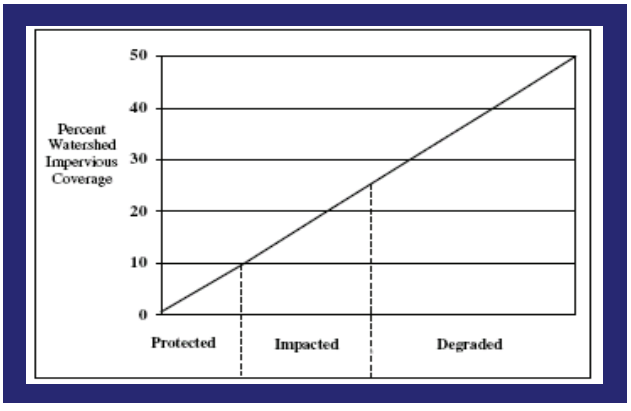
Impervious cover refers to any man made surfaces (e.g. asphalt, concrete, and rooftops), along with compacted soil, that water cannot penetrate.

Rain and snow that would otherwise soak into the ground turns into stormwater runoff when it comes into contact with impervious surfaces. Stormwater runoff carries dozens of pollutants, such as sediments, nutrients, pathogens, pesticides, hydrocarbons, metals and deicers, into our surface waters. ***Simply stated, any pollutant that is on the land will likely end up in stormwater runoff and ultimately into our water bodies.***

Polluted stormwater runoff is widely recognized by scientists as the greatest threat to water quality. In addition to changing the *quality* of water, impervious cover increases the *quantity* of runoff. Increased volumes and velocities of runoff erode stream channels and reduce the biodiversity of existing streams. Because water runs more rapidly off of an impervious area, flooding becomes both more common and more intense downstream. Meanwhile, because less water is soaking into the ground, water tables can drop and wetlands, streams and wells fed by groundwater can begin to dry up.

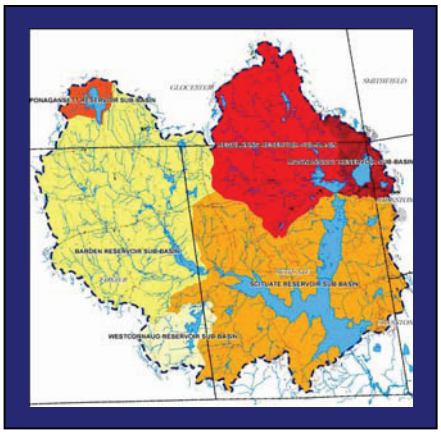
The Center for Watershed Protection developed the "Impervious Cover Model" which has been supported by over 200 studies. The Model is based on the average percentages of impervious cover at which stream quality declines, and classifies those impacts into three categories, making management decisions clearer:

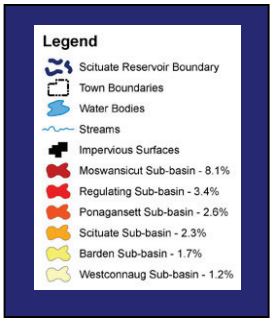
Sensitive streams have watersheds that are below a 10% impervious cover. Impacts are generally minor and the water quality and habitat is good to excellent.
Impacted streams have water quality and habitat impairments. These are found in watersheds between 10 and 25% impervious cover.
Non-supporting streams have severe water quality and habitat degradation in watersheds with over 25% impervious cover. The impacts are so significant that they are not considered suitable for restoration.



These ranges are part of a continuum, and there can be variation between individual streams. The model is most reliable when impervious cover exceeds 10%. In watersheds below 10%, water quality and habitat can be still be degraded where the forest cover is below 65%, the riparian or vegetated stream buffer is not continuous, and existing pollution sources, such as failed septic systems, are prevalent.

Approximately 75% of the stream miles that feed lakes, rivers and the Bay with clean water are headwater streams, small enough to be straddled by a child. These streams are very sensitive to land use changes in their small watersheds and are very susceptible to contamination If the level of imperviousness rises too far in these areas, irreversible damage can occur to drinking water quality, to groundwater supplying private wells, and aquatic wildlife habitat. As watershed towns grow, there will be increasing pressure to replace the natural hydrology with more impervious cover. Even when effective best management practices are widely used to try and mitigate the impacts of impervious cover, a threshold of imperviousness is eventually crossed beyond which the predevelopment water quality cannot be maintained.



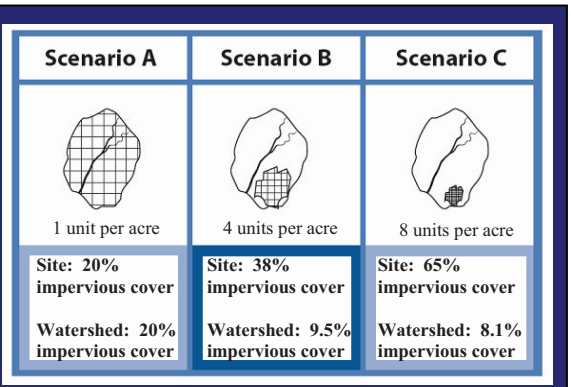


The existing impervious cover in the Scituate Reservoir Watershed Sub-basins is below 10%. However, Moswansicut sub-basin is 8.1% dangerously close to the 10% limit. Future growth must be carefully managed with strict zoning, impervious cover restrictions, required stream buffers and low impact development to protect drinking water quality.

Now is the critical time to evaluate the impact of future development to manage growth more effectively to minimize imperviousness and to protect the health of the watershed. By adopting more creative land use techniques and development standards towns can guide growth away from sensitive areas to those that can better accommodate it. Furthermore, by reducing impervious cover using a range of better site planning, design and construction practices, the health of the watershed can be protected even as growth continues.

Watershed Community Recommendations:

- Amend the comprehensive plan to establish 10% impervious cover as the maximum limit to be allowed.
- Establish a maximum density of 3 acres per dwelling unit to stay below the 10% impervious cover threshold.
- Adopt Conservation Development ordinances to significantly reduce impervious cover from roads and driveways, to guide growth to the most suitable development locations, and to preserve natural areas in perpetuity to maintain natural hydrology.
- Incorporate maps of all tributary streams, wetlands and other sensitive areas into the community comprehensive plan. This supports the basis for guiding growth away from these sensitive resources.
- Encourage mixed-use compact development in suitable areas. This will increase impervious cover on a site level but reduce overall impervious cover within a watershed.
- Adopt site planning and design techniques that reduce impervious cover such as narrower roads, shorter driveways and less parking area.
- Require Low Impact Development (LID) to more effectively manage stormwater runoff. LID encourages precipitation to be infiltrated as close as possible to where it reaches the ground to mimic pre-development hydrology.



Protecting Water Resources with Higher-Density Development, US EPA

The illustration shows the beneficial effects of clustering development to reduce impervious cover. If a watershed is developed as one-acre lots as shown in Scenario A, both the site and the watershed will have a 20% impervious cover, which is well above the recommended 10%. If that same number of homes is reduced to quarter-acre lots the site is 38% impervious, but the watershed is 9.5% impervious cover as shown in Scenario B. If all of the growth is clustered in a mixed-use village as seen in Scenario C, the site has a high impervious cover at 65% but the watershed remains well below the 10% threshold.

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